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Acrocomia media O.F. Cook Corozo

Palmaceae Palm family

John K. Francis

Acrocomia media O.F. Cook, known as corozo (Spanish) and prickly palm (English), is a handsome, medium-sized palm (fig. 1) native to the coastal areas and foothills of Puerto Rico and St. Thomas, U.S. Virgin Islands. The fruit and seed kernel are edible and have a high oil content but are seldom used. Despite its spiny trunk, corozo has become popular as an ornamental for use in landscaping.

HABITAT

Native Range

Corozo is native to Puerto Rico and St. Thomas in the U.S. Virgin Islands (fig. 2) and has been introduced as an ornamental in St. Croix, U.S. Virgin Islands (*4, 5*).

Climate

Corozo grows and reproduces in moist, lowland forests that receive from 1000 to 1900 mm of mean annual precipitation (author, personal observation). Although less common, the species does occur naturally in areas with more than 1900 mm of mean annual precipitation. In areas with less than 1000 mm of precipitation, corozo palms are confined to watercourses, intermittent streams, and microsites that receive runoff.

Soils and Topography

The most favorable habitats for corozo reproduction that also provide a competitive advantage in growth are the moist coastal sands. These are sands and loamy sands with pH's between 6.5 and 8.5 that are found at elevations of 1 to several meters above sea level. Other site types frequently supporting corozo are valleys, coves, streambanks, and pastures in the moist limestone hills in interior northern Puerto Rico and the upper valleys and hills above the southern coast of Puerto Rico. The soils are generally sandy loams, loams, clay loams, and clays with pH's from 5.5 to 7.0 and a relatively high amount of exchangeable bases. In the moist portion of the Island, the species generally does not grow at elevations above 200 m, but in the drier southern slopes, trees may be found at up to 400 m in elevation. Corozo rarely grows on upper slopes or hilltops.

Associated Forest Cover

The primary forest associates of corozo during pre-Columbian times are unknown; today, the species is found only in secondary forests. In moist, sandy coastal areas of Puerto Rico, associates of corozo usually include *Andira inermis* (W. Wright) H.B.K., *Calophyllum calaba* L., *Cocos nucifera* L., *Morinda citrifolia* L., *Roystonea borinquena* O.F. Cook, and *Terminalia catappa* L. (author, personal observation).

Figure 1.—*Transplanted corozo* (Acrocomia media O.F. Cook) *palms growing in Puerto Rico.*

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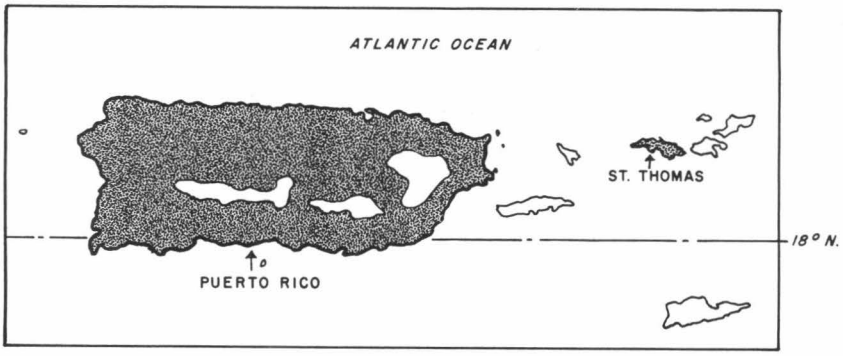

Figure 2.—*The native range of corozo* (Acrocomia media O.F. Cook) *in Puerto Rico and St. Thomas, U.S. Virgin Islands, represented by shaded area.*

LIFE HISTORY

Reproduction and Early Growth

Flowering and Fruiting.—The large flower clusters (panicles) emerge from below green leaves and bear numerous small, pale-yellow flowers. Male and female flowers are produced on the same branch (*5*). The closely related *Acrocomia aculeata* (Jacq.) Lodd. ex Mart. is predominantly cross-pollinated but retains the ability to self-pollinate (*7*). Beetles (Coleoptera family) are the primary pollinators. There is no reason to believe that corozo behaves differently than *A. aculeata*; isolated corozo palms are apparently pollinated and produce seeds. Flowering and fruiting occur throughout the year (*5*).

Fruits turn from green to greenish yellow when ripe; the mesocarp becomes fibrous with a gelatinous matrix, is oily, and has a sweetish taste. The fruits may remain on the tree for an additional 2 months or so after they ripen and then fall individually from the cluster.

Panicles may be void of fruit after periods of drought or where there is inadequate light under a forest canopy. Under ideal conditions, however, they may bear more than 900 fruits per cluster. Eight clusters harvested in a coastal stand in Puerto Rico contained from 67 to 901 fruits (author, personal observation). A group of 83 fruits weighed from this sampling averaged 24.3 ± 0.3 g per fruit. At fruit maturity, the seed within the hard shell is somewhat gelatinous. In the ensuing year on the forest floor, it becomes firm and oily.

Seed Production and Dissemination.—The similar *A. aculeata* reportedly begins flowering and fruiting when it reaches a height of about 4 m and is from 4 to 6 years of age (*2*). Corozo probably requires a bit longer. Theoretically, one fruit cluster could be produced for each leaf; in reality, only the dominant and codominant trees produce fruits and do so at much lower rates than the potential maximum. Vigorous trees might produce 2,000 or more seeds per year, and ordinary fruiting trees, 100 to 200 seeds. The seeds in two samples from Puerto Rico averaged 8.5 ± 0.2 and 9.3 ± 0.0 g per seed or about 110 seeds per kg (author, personal observation).

Seeds can be harvested by cutting ripe clusters of fruit from trees with pruning poles or by picking up seeds from the forest floor. Removing the seeds from the fruit is not an easy task when the fruit is fresh. The seeds can be removed relatively easily if the fruit is allowed to rot for 6 to 9 months in a moist environment. The advantage of harvesting from the forest floor is that the husks of fruits that have lain there a few months are easily separated from the seeds. Also, the subsequent waiting time for germination is reduced by months. No method of storage has been tested. It is assumed that storage in moist sand or peat at room temperature would not differ from the forest floor environment, and, therefore, germination would eventually occur in this simulation of natural conditions.

The most important dispersers of seeds appear to be fruit bats, which pluck the fruits and carry them to a perch where they chew off the rind and subsequently drop the seeds (author, personal observation). The Puerto Rican parrot (*Amazona vittata*), before its range was restricted, possibly also consumed corozo fruits. In the past, a now extinct macaw from Jamaica was known to have eaten fruits from *Acrocomia spinosa* (Mill.) H.E. Moore (*3*). Some seeds are also dispersed by gravity, water, and people. However, the vast majority of seeds come to rest within 3 m of the mother tree.

Seedling Development.—Germination of corozo seeds is hypogeous. First germination in one test in Puerto Rico, in which 23 percent ultimately germinated, began 565 days after sowing (author, personal observation). Attempts to increase and hasten germination by treating with hormones, boiling water, and scarification were unsuccessful. It is reported, however, that holding seeds of *Acrocomia* spp. in warm water for 2 weeks improves germination (*3*).

Wildlings are easily collected and transplanted from native stands. One- to three-month-old seedlings that averaged 15.7 cm in height were collected from a coastal stand, transplanted into nursery bags, and placed in a shadehouse. The seedlings showed little growth in the first 6 months but, afterwards, rapidly increased in height. Of the original 24 collected, 21 seedlings survived and reached an average height of 1.0 ± 0.1 m by the end of 1 year (author, personal observation).

No experience in planting corozo seedlings has been reported. However, potted seedlings are recommended. Probably any size seedlings can be used as long as adequate protection from weeds is provided. A spacing of 3 by 3 m or 3.5 by 3.5 m is probably adequate. The crowns of corozo do not continue to expand as in hardwoods, so thinning is not required.

Vegetative Reproduction.—No means of vegetative regeneration has been demonstrated.

Sapling and Pole Stage to Maturity

Growth and Yield.—The smooth, gray trunk of corozo is studded with 6-cm black spines, except where fires have passed through the stand and burned them off. A ring marks the position of each of the former leaves. The trunk has a very hard outer shell and an interior composed of a mass of stiff, wirelike vascular bundles with small amounts of powdery material between them. The leaves are 2 to 3 m long with a spiny axis and ribbonlike leaflets.

The tallest corozo observed by the author measured 18 m. A height of 15 m is probably maximum for the species in most stands. The 105 trees measured by the author ranged from 22 to 37 cm in diameter at breast height (d.b.h.) with an average d.b.h. of 27.9 ± 0.4 cm. Ordinarily, the trunk tapers smoothly from a slight swelling at the base to the thinnest point at about 1 m up; it then gradually increases to a slightly swollen midsection.

The growth rate of corozo may be described as moderate. Sixty-seven corozo palms scattered across Puerto Rico shed an average of 11.8 ± 0.6 leaves over the course of a year (author, personal observation). A typical tree has approximately 20 green leaves plus several brown or dry leaves waiting to fall. The green leaves last less than 2 years. A circular scar is left by each leaf and can be counted to approximate growth rate and age. The leaf-scar rings were counted up to 3 m high on 78 corozo palms across Puerto Rico. Using a standard leaf shed of 11.8 per year, these palms took an average of 4.86 years to grow the lower 3 m of trunk. Probably 2 to 4 years are required to begin forming a trunk. Based on these numbers, a 5.5-m tree with 3 m of trunk would require approximately 8 years to grow.

Rooting Habit.—After the hypocotyl emerges from the seed, a small bulb is formed from which numerous roots begin to develop as the leaves push upward. Seedling roots are white, stiff, and branch frequently (author, personal observation). The smaller diameter roots are covered by short, stiff root hairs. Adult roots reach a more or less constant maximum diameter of about 9 mm. The older roots are brown, gradually changing to white toward the tip. The roots of corozo do not damage sidewalks or curbs. These palms can therefore be planted in confined spaces when landscaping urban areas.

Reaction to Competition.—Corozo is intolerant of shade. Full or nearly full sunlight is necessary for seedlings to survive more than a year or so. Corozo palms with a developed stem can survive overtopping only by tree species that allow filtered sunlight to penetrate the canopy. Suppressed palms have small crowns and, if not released, probably lose vigor and die in several years. Suppressed individuals do not bear seeds; trees in an intermediate canopy position produce a few seeds. Seed production is low to high in codominant corozo palms. Dominants are the most vigorous but are rare in forest stands because of the species' low stature. Young palms can sometimes grow through moderate competition from grass, weeds, and brush. Growth and survival are best in open situations such as in pastures.

Damaging Agents.—Two Homopteran insects, *Ischnaspis longirostris* Signoret and *Pinnaspis buxi* (Bouché), are reported to attack the leaves (*6*). Insect damage to leaves or any other plant part does not appear to be a serious problem for this species. Wet-wood termites, *Nasutitermes costalis* (Holmgren), frequently build covered trails to the top of corozo palms but consume only the stalks of dead leaves.

Corozo palms tolerate salt spray (*3*) and are very resistant to throw and snapping in high winds (author, personal observation). Older trees of the species are resistant to fire as is evident in many areas by the scorch marks found on the lower trunks and an absence of spines in the lower 2 or 3 m (author, personal observation). Young corozo palms also appear to have some resistance to grazing probably because of the spines on the leaves.

SPECIAL USES

The seed kernels of corozo are edible with a flavor similar to dried coconut meat. They probably were harvested for food by the aboriginal inhabitants of Puerto Rico. The average weight of 101 corozo kernels (seeds with shells removed) harvested in Puerto Rico was 2.30 ± 0.05 g, about 25 percent of the weight of the seed (author, personal observation). The shells have an average thickness of 4 mm and crack explosively when hit with a hammer or pressed in a vise. The fruit mesocarp is also edible but is somewhat oily and not generally favored for human consumption. Livestock, however, readily consume it. Chemical analysis revealed the following nutrient concentrations in the fruit (exocarp and mesocarp): calcium (Ca), 3.4 mg/g; phosphorus (P), 0.47 mg/g; magnesium (Mg), 2.2 mg/g; potassium (K), 19.8 mg/g; nitrogen (N), .74 percent; and ash, 5.4 percent (author, personal observation). The seed kernel had the following concentrations: Ca, 1.2 mg/g; P, 3.8 mg/g; Mg, 1.8 mg/g; K, 5.3 mg/g; N, 1.8 percent; and ash, 2.0 percent. The N concentrations would indicate 4.6 and 11.2 percent protein for fruit and kernel, respectively. The meristem and undeveloped leaves (palm heart) are edible (*8*).

Harvesting corozo as an oil crop, as practiced with other members of the genus, has been suggested (*1*). This is possible because the fruit, as well as the kernel, contains oil. The mesocarp in *Acrocomia aculeata* fruit is reported to yield 56 to 70 percent of its weight in oil; 55 to 58 percent of the kernel's weight is oil (*2*).

Formerly, corozo was shunned as an ornamental because the trunk and leaves are armed with sharp spines and, therefore, hazardous to step on or brush against. However, in recent years corozo has become an important ornamental in institutional and commercial landscaping in the metropolitan areas of Puerto Rico. In this particular use, people do not usually approach them closely, so contact with the spines is unlikely. Forest trees are dug up with a backhoe and transported by truck to the landscaping site. After planting, the palms are held in place by wooden props for approximately a year until a new root system has been formed. The palms grow and flower normally in their new habitat. Only a small percentage of the transplanted individuals die. A concern with this trend is that the finite number of mature, seed-producing palms in the wildlands could be seriously reduced. Corozo palms are being grown from seeds to a limited extent, but it takes several years before they develop the handsome trunk that is in demand for landscaping.

The trunk of corozo has an outer shell about 1 cm thick that is very hard and nearly black in cross section. Samples from one tree in Puerto Rico had an average wood density of

0.99 g/cm^3 (author, personal observation). In the past, the outer part of corozo trunks were sawn into boards for use as flooring and carved into walking sticks (*5*). The hard shells of the seeds will take a high polish, so they are fashioned into rings and adornments for other jewelry.

GENETICS

About 26 species of *Acrocomia* have been described through the West Indies and Mexico to Argentina (*8*). However, many of them are probably not distinct species. Corozo is closely related to and resembles *A. aculeata*, a native of the Lesser Antilles (*8*). Two other members of the genus have been determined to have n = 15 chromosomes (*8*).

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